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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,184	10/31/2003	John T. Gasner	125.090US01	2505

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EXAMINER	
LEE, HSIEN MING	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 05/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,184	GASNER ET AL.	
	Examiner	Art Unit	
	Hsien-ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39-63,66,67 and 85-98* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *50-56,67 and 85-98* is/are allowed.

6)☒ Claim(s) *39-42,44,46,48,49,57,60,61,63 and 66* is/are rejected.

7)☒ Claim(s) *43,45,47,58,59 and 62* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

5/3/05

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *032105*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. The objection to claims 39, 41, 47, 52, 54, 55, 57, 58, 60, 63, 85-89, 92-93 and 95-98 is withdrawn.

2. The 102(b) rejection to claims 39, 50, 67, 90, 92 and 94; and 102(e) rejection to claims 50, 53 and 56 have been withdrawn in response to applicant's arguments filed 3/21/2005.

Grounds of Rejections

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 39, 41, 42, 44, 46, 48-49, 57, 60, 63 and 66 are rejected under 35 U.S.C. 102(e) as being anticipated by Imai et al. (US 2003/0045088).

In re claim 39, Imai et al., in Figs.3 ~11 and related text, teach the claimed method of forming an integrated circuit with circuitry under a bond pad, the method comprising:

- forming devices MISFET 5/6/7 in and on a substrate 1;
- forming a first metal layer 11 (Fig.3);
- forming a first layer of relatively thick insulating material 12/15 overlaying the first metal layer 11 (Fig.3), wherein the thickness of the first insulating layer 12/15 strengthens the integrated circuit;

- forming a top metal layer 18A/18B overlaying the relatively thick insulating layer 12/15 (Fig.4); and
- forming a bond pad 21B/22B and 23D on a surface of the top metal layer 18A/18B (Figs.10-11).

In re claim 41, Imai et al teach forming one intermediate metal layer 10/11 between the devices MISFET 5/6/7 and the first metal layer 11 (Fig.3).

In re claim 42, Imai et al teach patterning the first metal layer 11 to form gaps (Fig.3).

In re claim 44, Imai et al. teach that the gaps are formed to be oriented such that the impact on the current flow through the first metal layer 11 is minimized.

In re claims 46 and 48, Imai et al. also teach forming a sub-layer of relatively stiff material 19 (Fig.10), wherein the stiff material 19 can be silicon nitride (paragraph [0096]).

In re claims 49, Imai et al. teach that the relatively stiff material 19 is formed near the first layer of relatively thick insulating material 12/15 (Fig.10).

In re claims 57 and 60, Imai et al., in Figs.3 ~11 and related text, teach the claimed method of forming an integrated circuit with circuitry under a bond pad, the method comprising:

- forming devices regions MISFET 5/6/7 in and on a substrate 1;
- forming a first metal layer 11 overlying the device regions 5/6/7 (Fig.3);
- forming an insulating layer 12/15 overlaying the first metal layer 11 (Fig.3);
- forming a top metal layer 18A/18B overlaying the insulating layer 12/15 including a sub-layer of relatively stiff material 19 near the insulating layer 12/15 (Fig.4), wherein the stiff material 19 can be silicon nitride (paragraph [0096]); and

- forming a bond pad 21B/22B and 23D on a surface of the top metal layer 18A/18B (Figs.10-11).

In re claim 63, Imai et al. also teach forming one intermediate metal layer 14 between the first metal layer 11 and the device regions 5/6/7, and patterning the one intermediate metal layer 14 to form interconnects between the devices (FIG.3).

In re claim 66, Imai et al. teach forming at least one of the devices MISFET 5/6/7 under the bond pad 21B/22B and 23D (Fig.10).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 40 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imai et al..

In re claims 40 and 61, the selection of the first layer of relatively thick insulating material is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III

Allowable Subject Matter

7. Claims 50-56, 67, 85-98 are allowed.

8. Claims 43, 45, 47, 58, 59 and 62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record at least neither teaches nor suggests the gaps take up *no more than 10%* of the total area of the first metal layer under the bond pad (claims 43, 52, 62); patterning the first metal layer to form gaps, wherein the gap *extend in a current flow direction* (claim 50); the relatively stiff material is *TiN* (claims 47, 54, 58) or is *TiW* (claims 55, 59); at least one sub-layer of material that is relatively *stiff* is adapted to *prevent the cracking* of the one intermediate conductive layer (claim 85); and forming gaps in one of the one intermediate conductive layer closest the top conductive layer, the gaps being adapted to *prevent cracking* of the one intermediate conductive layers by forming pillars of relatively stiff insulation material passing through the one of the one intermediate conductive layers closest the top conductive layer (claim 95).

Response to Arguments

10. Applicant's arguments filed 3/21/2005 have been fully considered but they are not persuasive for the reasons as follows.

Regarding 102(e) rejection, applicant argued that layer 12/15 in Imai (US '088) are merely silicon oxide films, which cannot be interpreted as "the first layer of relatively thick

insulating material strengthens the integrated circuit." See first paragraph on page 15 in applicants' argument filed 3/21/2005.

In response to applicant's argument that the silicon oxide layers 12/15 cannot be used as strengthening the integrated circuit, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963). In this case, silicon oxide layers 12/15 in Imai is a relatively thick insulating material and capable of strengthening the integrated circuit at least because the first metal layer 14 and plug 13 are physically interlocking with the relatively thick insulating material 12/15, which can be used as strengthening the entire structure as shown in Fig.3.

Regarding 102(b) rejections, applicant's arguments are persuasive. The rejection has been withdrawn as set forth in this Office Action.

Conclusion

11. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-ming Lee
Primary Examiner
Art Unit 2823

May 23, 2005

HSIEN-MING LEE
PRIMARY EXAMINER 5/23/2005